

Notice of Allowability

Application No.

10/814,680

Examiner

Long K. Tran

Applicant(s)

LIN ET AL.

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to March 31, 2004.
2. ☒ The allowed claim(s) is/are 1,3-7,17,19 and 20.
3. ☒ The drawings filed on 31 March 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.


Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 3/31/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


David Nelms
Supervisory Patent Examiner
Technology Center 2800

Response to Preliminary Amendment

1. This office action is in response to Preliminary Amendment filed on March 31, 2004.
2. Claims **8 – 16** and **21 – 40** have been cancelled.

Information Disclosure Statement

3. Information Disclosure Statement (IDS) filed on March 31, 2004 is acknowledged.
The references cited on the PTO -1449 form have been considered.

EXAMINER'S AMENDMENT

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Charles W. Gaines on September 3, 2004.

The application has been amended as follows:

-- IN THE CLAIMS

1. (Amended) A semiconductor device, comprising:
a doped buried layer located over a doped substrate;
a doped epitaxial layer located over the doped buried layer;
a first doped lattice matching layer located between the doped substrate and the doped buried layer; and
a second doped lattice matching layer located between the doped buried layer and the doped epitaxial layer;

wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the doped buried layer.

2. (Cancelled)

3. (Amended) The semiconductor device as recited in Claim "1" [[2]] wherein a dopant concentration of the doped substrate is less than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the doped epitaxial layer is less than the dopant concentration of the second doped lattice matching layer.

4. (Amended) The semiconductor device as recited in Claim "1" [[2]] further including a third doped lattice matching layer located between the first doped lattice matching layer and the doped buried layer and a fourth doped lattice matching layer located between the second doped lattice matching layer and the doped buried layer.

5. (Original) The semiconductor device as recited in Claim 4 wherein a dopant concentration of the third doped lattice matching layer is more than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the fourth doped lattice matching layer is more than the dopant concentration of the second doped lattice matching layer.

6. (Original) The semiconductor device as recited in Claim 3 wherein the dopant concentration of the doped substrate ranges from about $1E14$ atoms/cm³ to about $1E15$ atoms/cm³, the dopant concentration of the doped buried layer ranges from about $1E19$ atoms/cm³ to about $1E20$ atoms/cm³, and the dopant concentration of each of the first and second doped lattice matching layers ranges from about $1E15$ atoms/cm³ to about $1E19$ atoms/cm³.

7. (Original) The semiconductor device as recited in Claim 1 wherein the first and second doped lattice matching layers each include a dopant gradient wherein a dopant concentration of each of the dopant gradients is greater adjacent the doped buried layer.

Claims 8 – 16 (Cancelled)

17. (amended) A integrated circuit, comprising:
a doped buried layer located over a doped substrate;
a doped epitaxial layer located over the doped buried layer;
a first doped lattice matching layer located between the doped substrate and the doped buried layer; and
a second doped lattice matching layer located between the doped buried layer and the doped epitaxial layer,
transistors located over the doped epitaxial layer; and
interconnects located within interlevel dielectric layers located over the transistors, which connect the transistors to form an operational integrated circuit;
wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the doped buried layer.

18. (Cancelled)

19. (Amended) The integrated circuit as recited in Claim "17" [[18]] wherein a dopant concentration of the doped substrate is less than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the doped epitaxial layer is less than the dopant concentration of the second doped lattice matching layer.

20. (Original) The integrated circuit as recited in Claim 17 further including additional active and passive devices.

Claims 21 - 40 (Canceled). --

5. Claims **1, 3 – 7, 17** and **19 – 20** are presented for examination.

Allowable Subject Matter

6. Claims **1, 3 – 7, 17** and **19 – 20** are allowed.

7. The following is an examiner's statement of reasons for allowance: Claims **1, 3 – 7, 17** and **19 – 20** are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the doped buried layer; and among other limitations as cited in the independent claims 1 and 17.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran *LT*
September 3, 2004


David Nelms
Supervisory Patent Examiner
Technology Center 2800